

Laboratory Respirator Protection Level (LRPL) Testing

Mask Fit Testing Facility

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LRPL Test Mission

- The Mask Fit Test Facility is designed for use in evaluating the performance of new respirators and chemical protective clothing ensembles. The Mask Fit Test personnel are trained to set up protocols and perform the fit factor testing with “state-of-the-art” equipment.

Customers

- Domestic Preparedness
- M40 Mask Team
- M45 Mask Team
- JSGPM Mask Team
- DOJ
- TSWG
- TSAs (Fume Free, MSA, ILC, Interspiro)
- NIOSH CBRN SCBA



Total Testing Accomplished

- In the last two years over 35 different items have been tested at the Mask Fit Test Facility.
- A total of 840 different test volunteers have been used.

Current Testing

- Domestic Preparedness
- TSWG (Escape Hoods)
- TSAs (Fume Free)
- DOJ (LANX Suits)
- NIOSH CBRN SCBA

LRPL Testing - Human Use

- At least 22 different civilian or military subjects are tested per item.
- “Joint Service Standardization Agreement for Fit Factor Testing of Military Masks”, 1 Oct 91 (approved 8 Apr 92)

LRPL

- Expression of performance based on the ratio of concentration outside the mask/suit to concentration inside the mask/suit, or $(C_o/C_i) = LRPL = PF$
- Example : 1000 ppm/1.0 ppm = 1000 LRPL
- In other words, the air inside the mask/suit is 1000 times cleaner than the outside air.

Proper Testing Simulant Corn Oil Aerosol

- Impermeable Suits - Level A , Level B
- Respirators- Negative, PAPRs, SCBAs, Escape Hoods

Aerosol PF Chamber

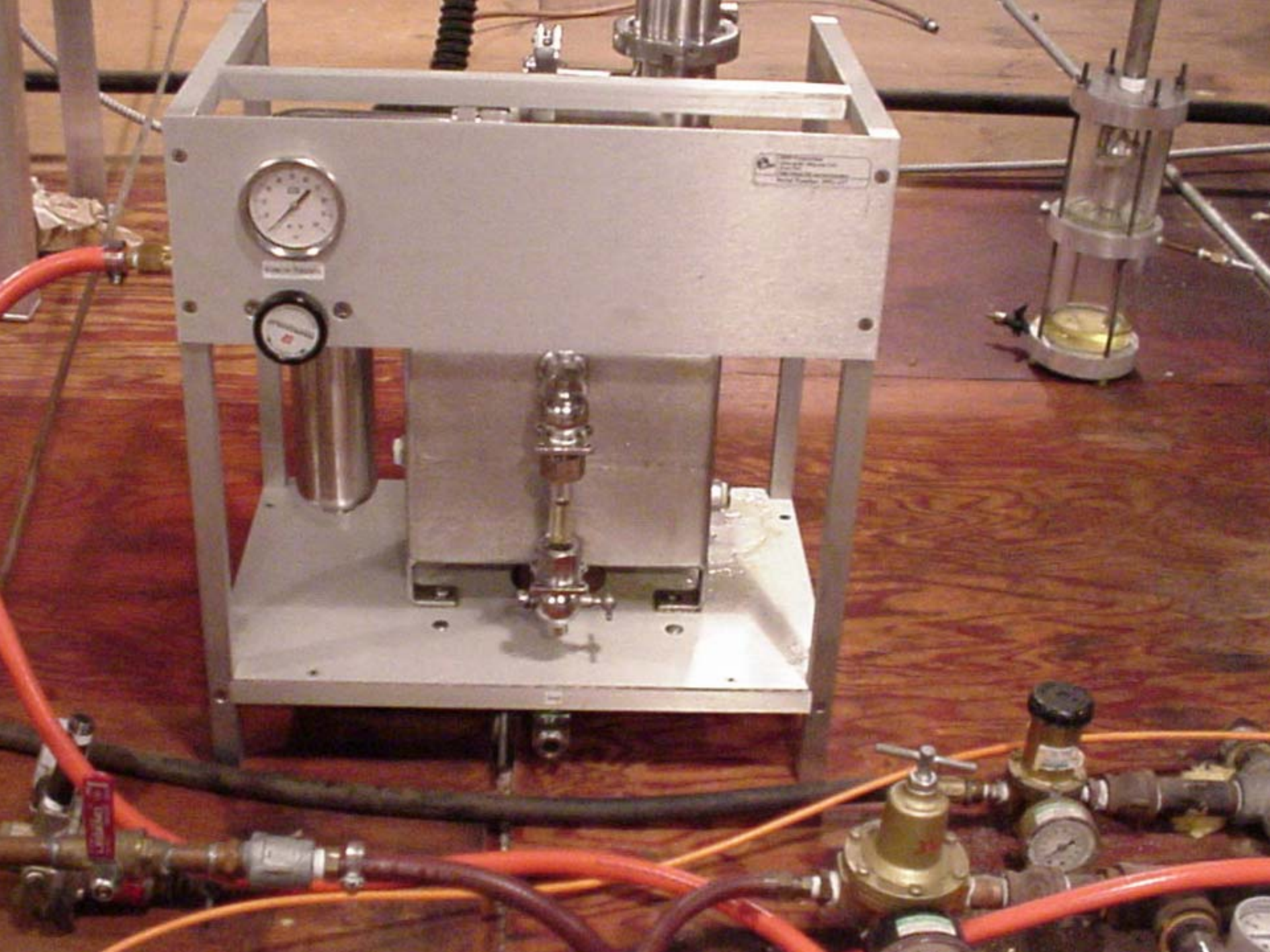
- Laser Photometers
- State-Of-Art Aerosol Generation System
- New Filtration Unit
- New Plenum and Duct System
- Flat Panel Technology Control
- Environmental Unit

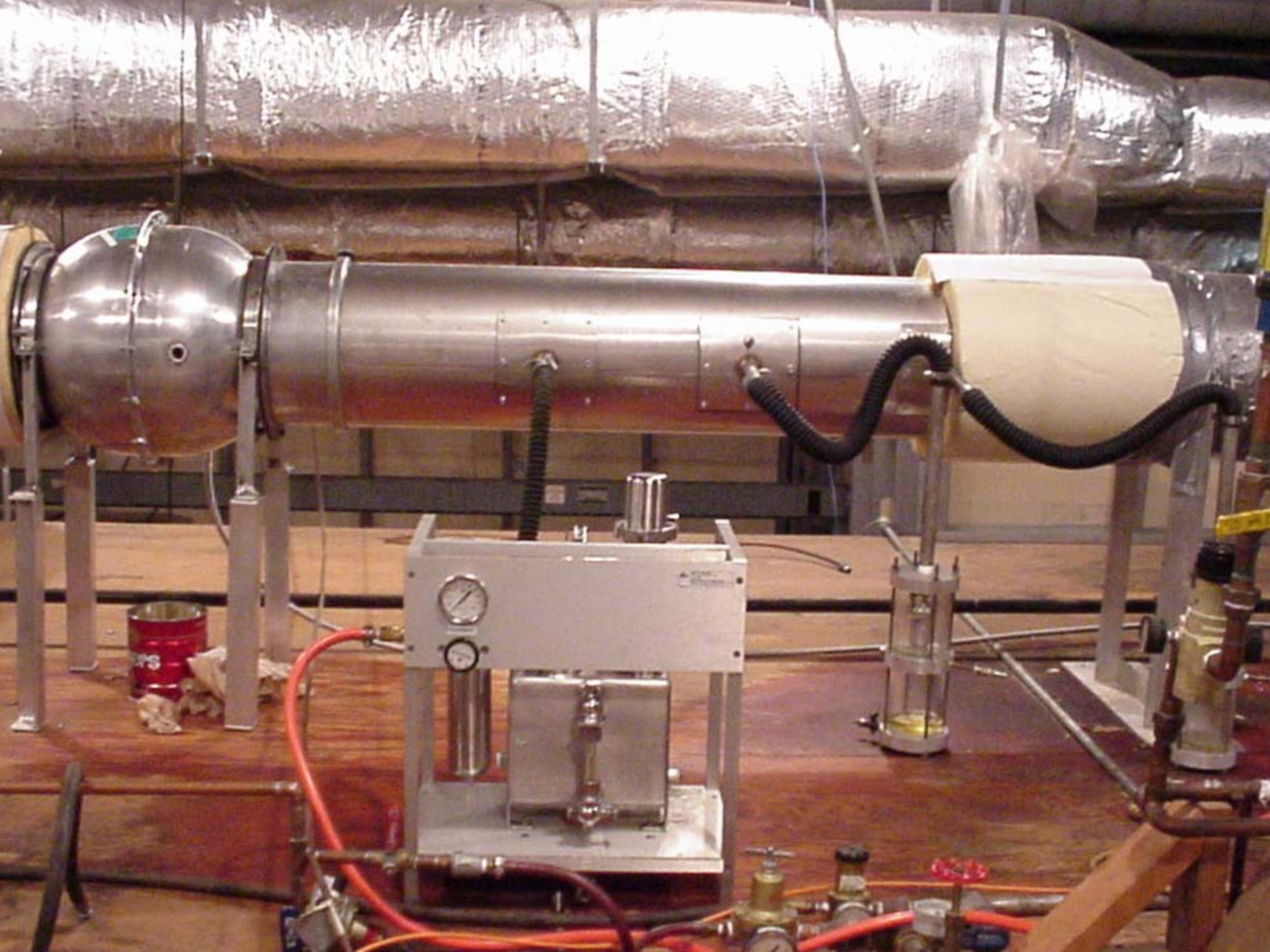
Laser Photometers

- Rear - light scattering
- Clean sheath air flow
- 2.2 liters/minutes
- MTBF = 85,000 hours
- Self calibrating
- Zero start up time
- Refractive index for Corn Oil

Aerosol Generation System

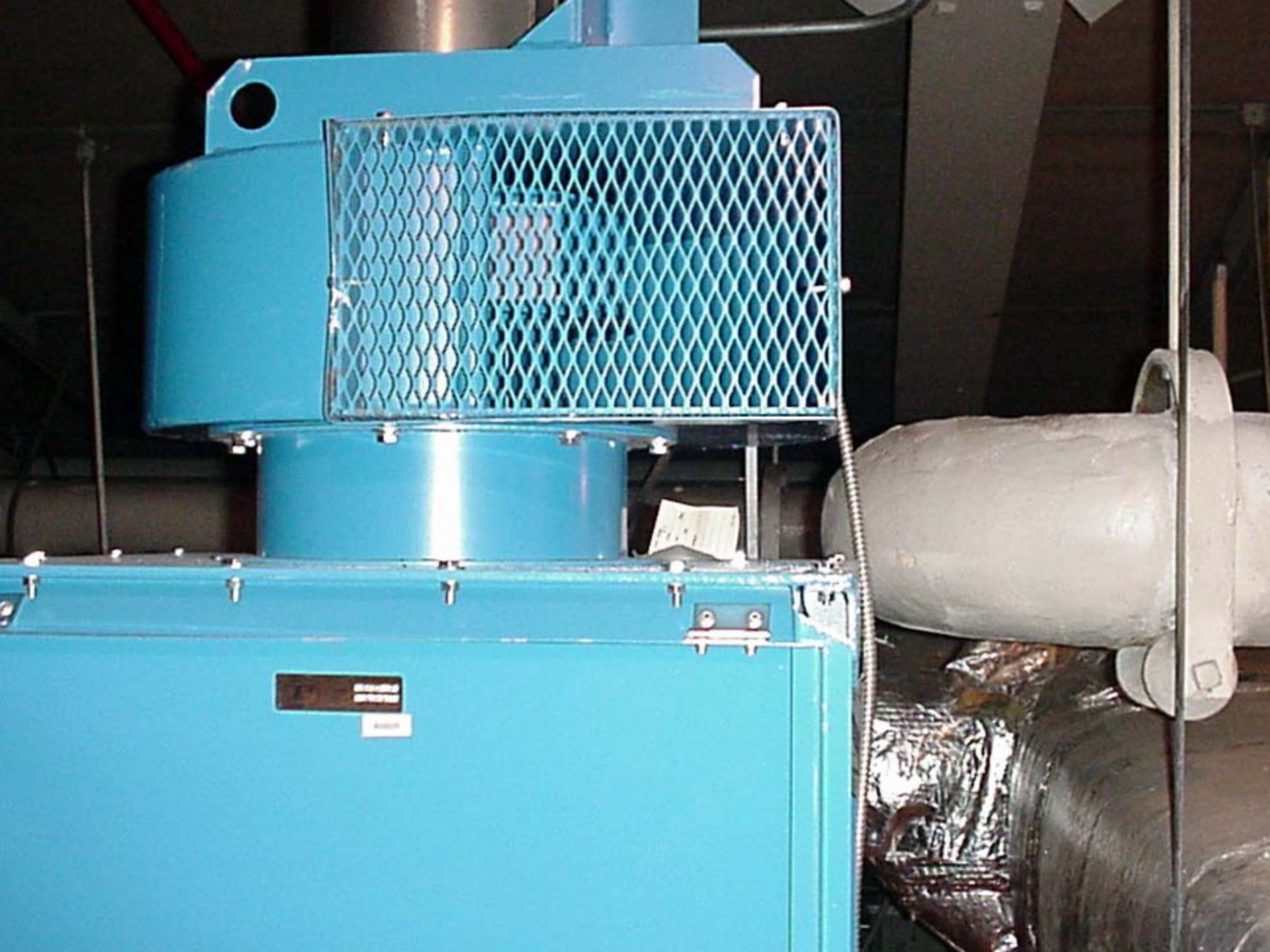
- Stainless-steel generator
- Laser drilled cylinder .4-.6 microns
- One generator (2 g/hr)
- 20-100 psi without failure
- 20-23 mg/m³ +/- 3 mg/m³ in 5 minutes





Filtration Unit

- Farr Filtration Unit
- 100-2000 CFM
- Air - exchange is 10 times per hour.
- Filters both vapors and aerosols.
- Filters are easily changed.



ECU

- 100- 2000 CFM
- Temperature Range 65° F to 95° F +/- 5°F
- Humidity Range 35% to 100% +/- 5%













Notional CBRN APR LRPL Testing

- NIOSH Certification of APRs for Chemical, Biological and Radiological Threats.

Equipment Required

- Masks will be probed by SBCCOM .
- Fitting, Donning, and Sizing Information.

APR Sizing

- APR sizing will be determined using the Los Alamos Anthropometric Panel.
- Number of subjects to be tested in each size will be determined by the Los Alamos Panel.

APR Training

- Subjects will be trained on the APR following the manufacturer's donning instructions or video.
- Notional: Maximum time for subjects to achieve seal don will be 8 seconds. 14 seconds total for mask and shroud together.
- Proper seal don will be verified during LRPL testing.

APR LRPL Testing

- Standard 11 exercise NIOSH/SBCCOM LRPL scenario.
- Two trials per subject using the same respirator but re-donning for each trial.
- Full Panel participation for each APR model.

APR LRPL PASS RATES

- 95% Pass at the 1000 LRPL. (M40 Mask achieves 91% pass rates at 6667)
- QA problems will be noted and submitted in Test Incident Report (TIR).
- Human errors not attributed to fit will be removed from final analysis and will not impact mask performance.

Future Capabilities

- Corn Oil Chamber Environmentally Controlled
- Flat Panel Technology
- Vapor Testing Standardized
- Expanded Chamber to Handle Future Work
- Obstacle Course Construction
- SF6 Capabilities
- Escape Hood Tester (Neck Dams)

Questions?